FAA | AVIATION NEWS

NOVEMBER 1962

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HUMAN FACTORS IN AVIATION

Dedication of the FAA's new Civil Aeromedical Research Institute (CARI) in Oklahoma City last month marked a significant step forward in U. S. civil aviation development.

For the first time, the human factor will get the attention it deserves in the planning and operation of the Nation's air fleet. This research can contribute to the development of aviation in two ways: first, by increasing public confidence through an improved safety record; second, by improving the efficiency of the National Aviation System.

This improved efficiency can come in a variety of ways. Aircraft can be made simpler—and safer—to fly by tailoring their cockpits and systems more specifically to human needs. The air traffic control system will be improved through better selection of controller trainees and through better working environments for controllers. These are only a few of the possibilities.

The military services have been conducting aeromedical research for several years, and they have their own facilities. But their work has been oriented toward military requirements, and lately they—along with the National Aeronautics and Space Administration—have been concentrating more and more on space work. So CARI fills the gap with its civil aviation role.

Research isn't the whole story at CARI, of course. This organization also evaluates the physical and mental qualifications of nearly half a million active airmen, and it develops the standards used in medically certificating all these airmen. It cooperates with the Civil Aeronautics Board in human factors accident investigations, and it provides medical support to FAA personnel in their daily work.

This total aeromedical effort is aimed at assuring adequate medical standards and contributing to the improvement of the tools and techniques used by the Nation's airmen

CARI's highly competent staff and specialized facilities are expected to play a significant role in aviation's drive toward the goal of ever safer, more efficient flying.

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***COVER:** Control tower and terminal at Dulles International Airport, new gateway to the Nation's capital, glow a welcome to airmen and passengers from around the world.*

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FAA Dedicates Civil Aeromedical Research Institute

Civil aviation's first large-scale human factors research facility was dedicated last month by FAA Administrator N. E. Halaby at the Agency's Aeronautical Center near Oklahoma City.

The 214,000-square foot Civil Aeromedical Research Institute (CARI) houses 27 laboratories manned by a staff of 200. Machinery and equipment, much of it specially designed, are capable of testing and analyzing physical and mental processes related to civil flying.

Studies at CARI will probe aspects of civil aviation ranging from aerial application and week-end flying to jet pilots and passengers aboard supersonic transports.

"Just as military and aerospace researchers are exploring the special human factors problems of fighter pilots and astronauts, FAA is directing its attention to the same problems in civil aviation with what we believe will be important benefits to every user of the airspace," Halaby said in dedicating the Institute.

"The FAA is working today in many areas—including aeromedical research—to eliminate carelessness, neglect and incompetence from civil aviation and to provide airmen and the public with the highest attainable level of air safety. . . . We hereby dedicate this facility to that high purpose," Halaby stated.

Research into the medical aspects of civil aviation lagged until recently. Gen. James H. Doolittle, who addressed physicians attending a symposium at CARI,

Gen. Doolittle lauds civil aeromedical research.

said: "With the dedication of the Civil Aeromedical Research Institute building, the effort to bring the human factors side of civil aviation abreast of engineering will be greatly accelerated."

While man seeks to conquer outer space, Doolittle said, "inner space . . . has, despite the great amount of aeronautical research, by no means been entirely conquered."

Aeromedical research at CARI taps the talents of a number of scientific skills —physicians, physiologists, psychologists, physical anthropologists, engineers and flight test pilots. Their goal, safety in the air, takes them along a number of scientific avenues. Among these are fields such as neurophysiology, biodynamics, psychology, pharmacology-biochemistry, and protection and survival.

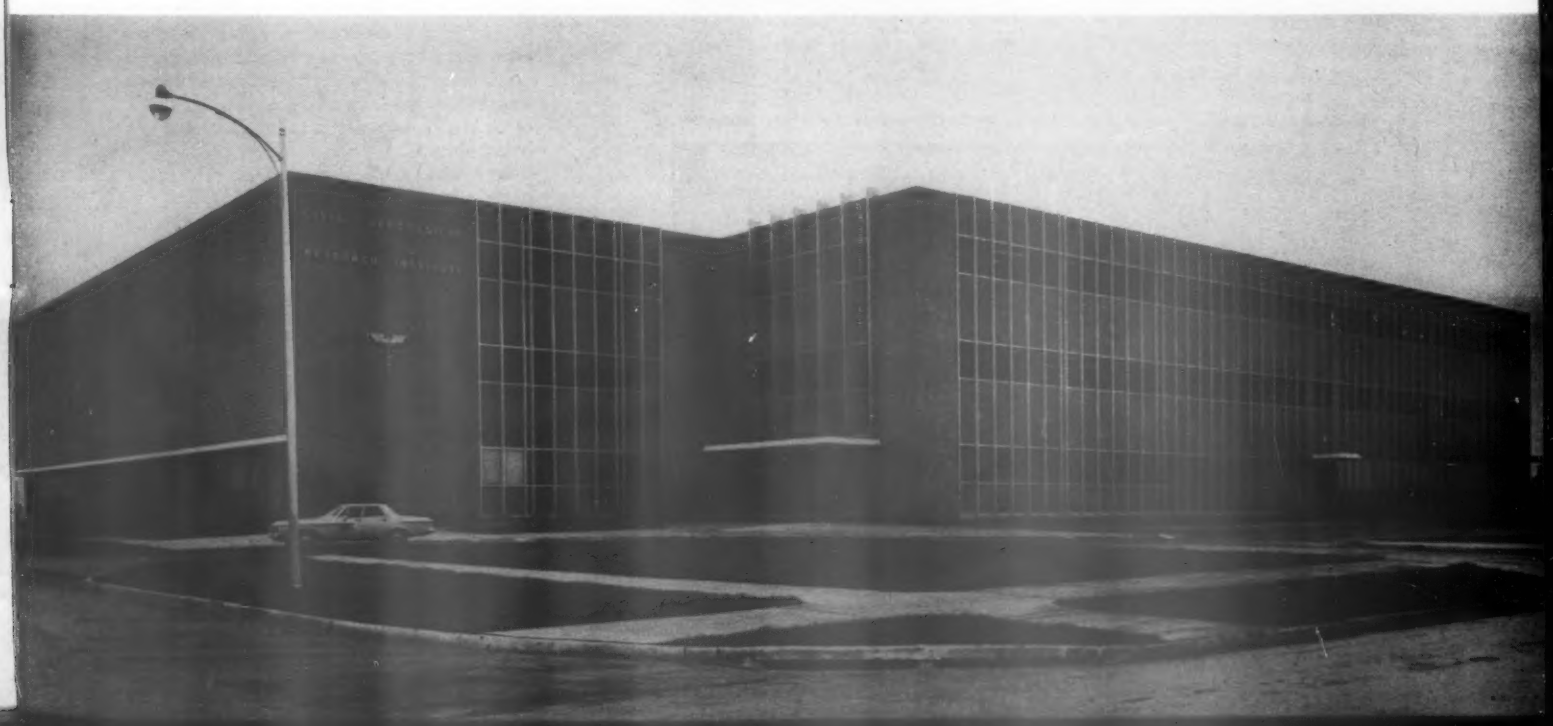
CARI projects fall into these broad categories:

- **Physiological stress, fatigue and aging** related to proficiency of air traffic controllers and air crew members.
- **Psychological stress, fatigue and aging** factors related to proficiency of controllers and airmen.
- **Proficiency,** selection factors and optimum characteristics of controllers' working environment.

The findings of one of the projects on the psychology of air traffic controllers has already borne fruit. CARI investigators gave psychological tests to traffic control students, then correlated the test results with the students' performance while in training at the FAA Academy at the Aeronautical Center.

By setting minimum cut-off scores on the tests at an appropriate level, candidates for air traffic control training now can be screened prior to training and those with low aptitude can be eliminated. Previously, these people were not eliminated until after their training was completed or during their first year as controllers.

By eliminating unfit candidates prior to training, it is estimated this $40,000 study will save more than $2,000,000 over 10 years. One discovery showed that



Motor-driven treadmill (above) is used to evaluate physiological stress encountered by air traffic controllers. *Below*, climatic altitude chamber tests human tolerances.

Biochemist and pharmacologist test pesticides in CARI's modern toxicology laboratory.

people over 35 who go into air traffic control training have a very high failure rate.

In another study, CARI researchers are looking into the subject of possible excessive fatigue among pilots of large civil jet airplanes. This subject is hard to define, difficult to measure and complicated by possible pilot-airline contractual relations.

Some feel that the increased demands of jets for greater pilot alertness produce mental fatigue and reduce efficiency. Others suggest that since a given jet flight is now more quickly accomplished, jet pilots must make more individual flights to reach the 85-hour maximum allowable number of flying hours each month.

CARI's broad capabilities have also placed it in position to make major contributions to Project Little Guy, the FAA program to develop a simplified cockpit layout for light aircraft. Little Guy research and development aims at improved, more easily read cockpit instrumentation, greater visibility and enhanced over-all safety for pilots of smaller aircraft.

● **Passenger and crew emergency procedures and safety measures.**

This research area includes a study of emergency evacuation factors in large civil aircraft—narrow aisles, escape doors, inadequately briefed passengers, elderly women, children, etc. A CARI study of an accident involving a twin-engine Convair disclosed how improperly installed rear-facing seats caused vertebral fractures in certain occupants.

● **Drug effects on performance and safety.**

Researchers are looking into behavioral changes immediately following the use of alcohol and the subtle residual effects that persist for 24 hours.

Air traffic controllers, non-pilot air crew members and maintenance men may be taking various drugs—aspirin, antihistamines, barbiturates, etc.—so the role of drugs in reducing performance also is being studied.

● **Aerial applicators**—effect of toxic chemicals on health and safety.

The accident rate in this field, in which more than a million hours are flown annually, is the highest of any segment of general aviation. Possibly one-half of the fatal accidents are due to reduced pilot proficiency caused by absorption of certain chemicals used in crop dusting and spraying. At certain levels of absorption, the pilot's nervous system is poisoned so that his reactions and decisions in flight are impaired.

CARI researchers are refining blood tests that give an index of how much

As part of CARI research, oxygen equipment is tested to determine physiological problems bearing on passenger and crew safety in high altitude flight.

poison a given pilot has absorbed. In addition, protective equipment is being developed to aid the pilot, his "swampers" and his flag man to avoid contamination.

● **Preventing injury in airplane accidents.**

Aircraft manufacturers and the airlines are becoming increasingly interested in incorporating anti-crash injury features in their equipment. CARI is working with these groups by supplying vital information. The data is obtained at the scene of selected accidents by determining the causes of specific fractures, lacerations and internal injuries.

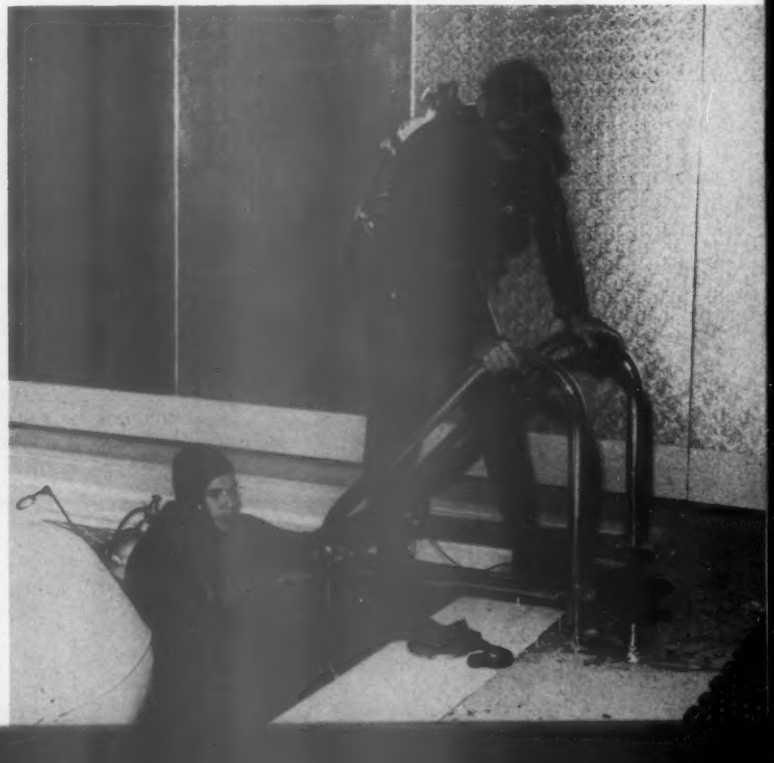
Modification of hazardous structural features which can be changed without altering function are recommended. Investigators at CARI subject themselves to impact tests to test the cushioning effects of various substances. One researcher has absorbed as much as 100 Gs of deceleration forces through 8 milliseconds in a vertical drop, using Stafoam as a cushion.

Also being sought are restraint systems which protect crew and passengers from flailing injuries. A particular need exists for proper shoulder harnesses for people of all heights and weights and for infant protection equipment.

● **Physiologic Age Rating for Pilot Certification.**

Long range studies are being made (*see* **FAA Aviation News,** Aug. 1962) to determine the physical age of pilots as contrasted with their chronological age. Because people age at different rates and their performance is affected in different ways, it is important to establish physical standards for airline pilots who now must retire at the arbitrary age of 60. As an outgrowth of this study, it may be possible to tailor a retirement age to each pilot —based on his aging rate—instead of relying on a blanket age limit.

In survival tank having controlled water and air temperatures, ditching and escape methods are studied and survival and flotation equipment evaluated.



FAA to Expand Positive Control Across Nation by September, 1963

Area positive control service is being expanded across the nation in a top priority FAA effort to make flying safer and more efficient.

The program, as announced by Administrator Halaby, calls for 23 FAA Air Route Traffic Control Centers in the 48 States to be ready to provide area positive control service to all flight operations above 24,000 feet by the end of September 1963.

Halaby said that expansion of the service is necessary to assure today's high altitude, high speed jets safety and efficiency in their operations. He pointed out that the program will be expanded in accordance with the timely delivery and installation of radar beacon decoders and radar bright displays in the 23 Centers.

A total of 69 long range radars will be used to provide positive control service above 24,000 feet. The national application of area positive control will be dovetailed with the completion of the new buildings for FAA's Centers.

Positive control was first provided in June, 1958, on three transcontinental airways between 17,000 and 22,000 feet. Pilots were required to have an air traffic control clearance to fly on positive control airways specifically designed for the service. No Visual Fight Rules (VFR) operations were allowed on these airways. Beginning October, 1960, positive control underwent evaluation on an area basis—Operation Pathfinder—which permitted operating both on and off routes.

The new positive control airspace was first established at 24,000 feet to 35,000 feet and later raised to 60,000 feet so that high altitude military operations could be served. The horizontal dimensions were extended from 110,000 square miles, located within the control areas of the Chicago-Indianapolis Centers, to approximately 220,000 square miles with the addition of airspace covered by the long range radars of the Detroit-Cleveland Center complex.

Positive control offers distinct advantages over routine air traffic control service. The continuous use of radar is part of the service, making it possible to more efficiently separate aircraft. The prohibition of VFR planes from positive control airspace eliminates unknown aircraft, making it easier for the controller to provide efficient service with added safety.

To obtain air traffic control clearance to operate under positive control, pilots must be instrument-rated and their aircraft equipped for Instrument Flight Rules (IFR) operation. They must have two-way radio and coded beacon transponders for rapid and positive radar identification.

Positive control service will be expanded by Center and groups of Centers according to the following priority: Oakland; Memphis-Atlanta-Jacksonville; Minneapolis; Fort Worth-San Antonio-New Orleans-Seattle; Denver-Kansas City-Los Angeles; Phoenix-Albuquerque-El Paso-Washington, D. C.; Salt Lake City-Boston-New York; and finally, Miami.

The Great Falls, Mont., and Minot-Grand Forks, N.D., areas, as well as some very small areas on the northern and southern boundaries of the U. S., will be covered with positive control service after September 1963.

AGENCY ESTABLISHES OFFICE FOR GENERAL AVIATION AFFAIRS

William J. Schulte has been named Assistant Administrator of FAA's newly created Office of General Aviation Affairs to more fully recognize this fast growing segment of civil aviation.

In addition to handling general aviation matters, the new organization will become the focal point for Congressional matters and programs of aviation education conducted in cooperation with state and local officials and aviation organizations. Schulte had served as Special Assistant to the Administrator for General Aviation since March.

In announcing the appointment, FAA Administrator N. E. Halaby said: "There are more than 80,000 airplanes in the general aviation fleet now. We expect this fleet to increase to 105,000 by 1970. FAA recognizes that this rapid progress will create problems, as any vital force always does. We will look to our new Office of General Aviation Affairs to resolve the problems and meet the requirements of this growing segment of aviation, to provide liaison with aviation groups, and, in general, to better serve aviation."

Schulte is a businessman and rancher from El Reno, Oklahoma. He has been active in general aviation for almost 30 years. He soloed in 1933 and currently holds a commercial pilot's license. He uses light airplanes extensively in connection with his business and ranching operations, and has logged more than 3,000 hours.

Survey of Maintenance Airmen To be Conducted During November

A survey of certificated maintenance airmen in the United States is being conducted this month by FAA to find out how many are active and what types of work they do.

The survey, which runs from November 1 through November 30, is directed at certificated mechanics, repairmen and authorized inspectors in all segments of aviation. This includes the airlines, general aviation and aircraft manufacturers, as well as certificate holders not currently working in aircraft maintenance. Military personnel holding civil maintenance certificates also are asked to participate.

George C. Prill, Director of FAA's Flight Standards Service, said the data is needed to evaluate and plan the maintenance airmen certification and surveillance program. He pointed out that the program has remained relatively unchanged for more than 30 years, and probably should be realigned with the responsibilities of maintaining modern, complex aircraft.

The information sought by the survey is similar to that which will be obtained from the Agency's proposed renewal program for all airmen certificates. Since full data from this program will not be available until July 1965, all maintenance airmen are asked to participate in the present survey.

To date, more than 119,000 maintenance airmen certificates with ratings have been issued. Little information, however, is available on the number of active certificate holders, industry utilization of these airmen, the types of equipment on which they work, or their activities and duties. The survey will develop this data.

Questionnaires used in the survey may be obtained from any FAA district or international field office. In addition, the forms will be given wide distribution through the aviation community. Each questionnaire bears a postpaid return envelope.

General Aviation Leads the Way In Increased Air Traffic Activity

Air traffic activity for the 12 months ending June 30, 1962 was greater than for any previous year.

A particularly significant contribution to this over-all increase was general aviation operations. Of the total 27,415,508 landings and takeoffs recorded by FAA's 263 control towers for the year—a 7 percent increase over the previous year—16,422,065 or 60 percent of the total were attributed to general aviation.

This general aviation activity was 10 percent higher than the previous year.

In contrast, while air carrier operations also went up—from 6,969,367 to 7,147,920—this increase reflected only a 3 percent rise.

General aviation showed similar increases in the number of IFR aircraft handled by FAA's 36 Air Route Traffic Control Centers. Of the 10,080,122 IFR planes handled, the general aviation workload numbered 852,185—a 19 percent increase over the previous year.

Air carrier operations handled by the Centers rose from 5,130,373 to 5,486,065 during the year, an increase of 7 percent.

The relatively lower tempo in air carrier activity was due primarily to the transition from piston to turbine aircraft. While this resulted in greater passenger load capacity, statistically it dropped the operational count.

Further evidence of increased aviation activity is reflected in the number of flight plans originated at Flight Service Stations during the year. During fiscal year 1962, nearly 3,200,000 flight plans were originated, an increase of 39 percent over the previous 12 months.

Among the leading Centers in the total number of aircraft handled were New York (769,054), Chicago (542,246) and Washington (527,484).

The Chicago O'Hare tower led the nation in total aircraft operations with 374,000, or one operation every 84 seconds. Los Angeles was second with 345,486 and Miami third with 311,915.

In general aviation itinerant operations alone, the Van Nuys, Calif., tower led with 144,500 flights, with Phoenix and Long Beach next in order with 137,788 and 127,854 operations.

Use your check list. ***Signs like this one at Lebanon (Mo.) Municipal Airport have been distributed by FAA to more than 800 airports throughout the 11 states of the Central Region. Printed on dayglo type paper and designed for mounting on permanent sign boards at both ends of runways, the signs are a reminder to pilots that using check lists is a good safety procedure. FAA statistics show that nearly three-fourths of all accidents occur either in takeoff or landing.***

Policy on Status of Rulemaking To Keep Public Better Informed

FAA has initiated a new policy to keep the aviation public informed on the status of proposed regulations which are no longer under consideration or no longer current.

When the Agency decides to abandon proposed rulemaking, a notice now will be published in the **Federal Register** that the proposal is no longer under active consideration.

Similarly, to assure that comments submitted on a proposed rule by the public are timely and reflect the current situation, the Agency will issue notices to terminate proposed rulemaking when more than six months have elapsed from the closing date for public comment.

When there is justification, however, extensions of not more than three months at a time may be authorized by the Director of the Service involved.

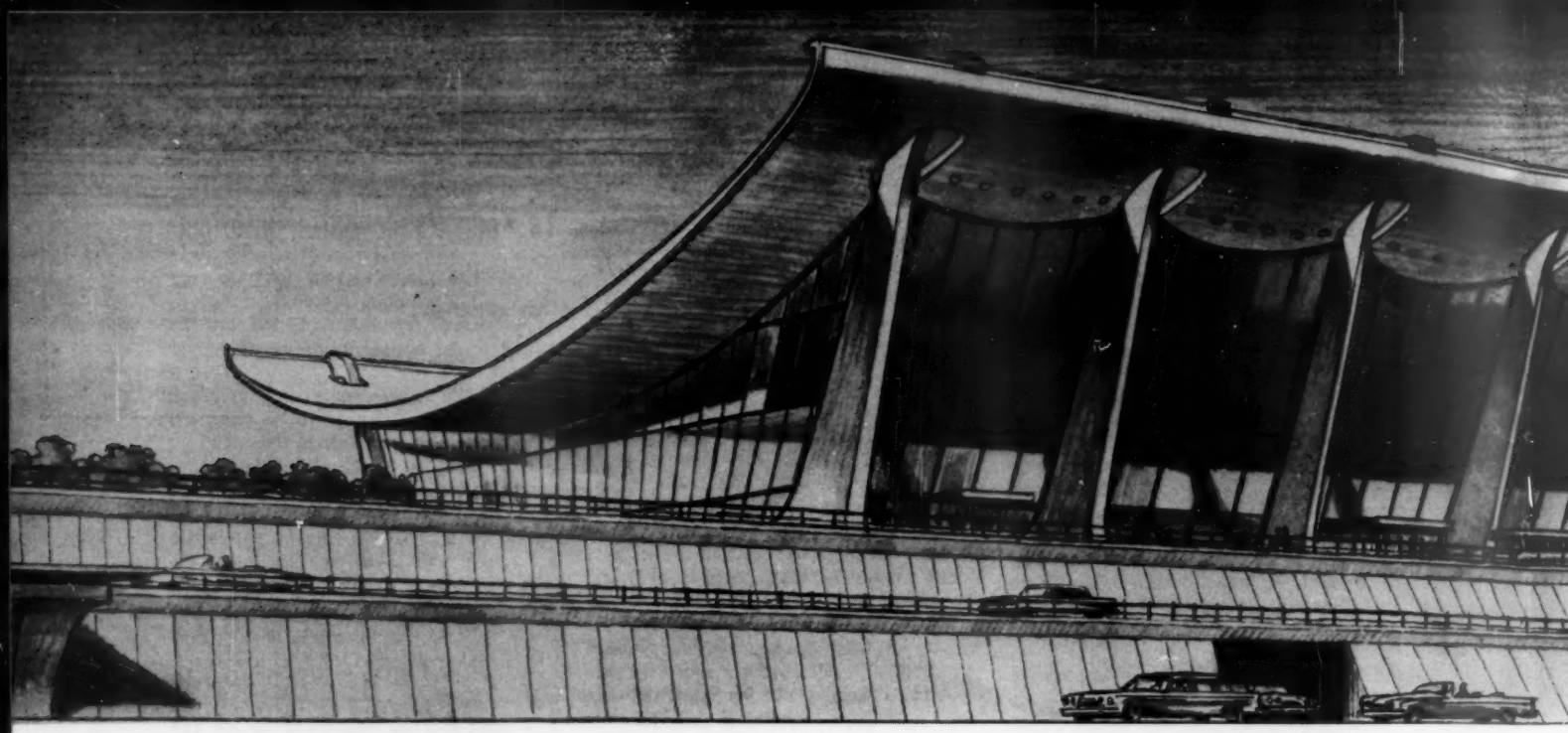
The termination of proposed rulemaking will be published in the **Federal Register** in the same manner as the notice was issued, with the reasons for the action. Such a notice will not prevent the Agency from issuing another rulemaking notice in the future, or commit it in any way to a specified course of action.

Summary Edition of Airspace Utilization Plan Now Available

An abridged edition of the Agency's plan for modernizing the national airspace system has been published and is available at 45 cents a copy from the Superintendent of Documents, Washington 25, D. C.

A Summary of the First Edition of the Design for the National Airspace Utilization System is a condensed version of the earlier report, which was released on a limited basis in August. The abridgment is an easy-to-understand, liberally illustrated 72-page booklet which condenses the original 758-page report of the design for progressive improvement of the airspace utilization system to meet the nation's requirements through 1975. It describes the six stages involved in improving the air traffic system to keep abreast of present and future needs.

Albert Brown, assistant director of FAA's Research and Development Service, headed a 13-man system design team which drew up the original report based upon general recommendations of the Project Beacon report on modernizing the air traffic control system.



DULLES INTERNATIONAL AIRPORT . .

A Civil War battleground which once resounded to the clatter of cavalry awakens this month to the roar of jets as Dulles International Airport is dedicated to a new era in aviation.

The jet age airport was built by the Federal Aviation Agency 27 miles west of Washington, D. C., near Chantilly, Va. FAA Administrator N. E. Halaby has described it as "an international gateway to this country of which every citizen can be proud."

Boldly conceived and strikingly executed, the airport was designed to satisfy both passenger needs and the challenge of complex airport operations posed by high-speed jets. The functional beauty of the terminal building is augmented by an innovation in air travel—the mobile lounge.

The need for a new airport in the Washington area was recognized some two decades ago—before commercial jet transports came into use. First step towards its construction was taken in 1950 when Congress authorized a second airport for the Washington, D. C., area and appropriated $1 million to launch the project. Controversy over sites held up the airport for six years. Finally, in December, 1957, on the basis of an analysis of several airport sites by the Baltimore firm of Greiner-Mattern Associates, E. R. Quesada, then Special Assistant to the President and later first FAA Administrator, recommended the site near Chantilly.

The report said, in part: ". . . Our estimates and forecasts of the aeronautical demand of the area are such as to strongly urge the development of an airport capable of accommodating aircraft with widely divergent performance characteristics and the greatest possible traffic volume . . . Our analysis shows that the lack of adequate capacity at the Washington National Airport has created a deterrent to the normal anticipated development of satisfactory air service to the Nation's Capital." President Eisenhower endorsed Mr. Quesada's choice of the Chantilly location in his report to Congress.

Teamed with the Government in the new venture were Ammann and Whitney of New York as the prime contractor for the airport design; the late Eero Saarinen for design of the terminal building, control tower and service buildings; Burns and McDonnell of Kansas City for the design of the mechanical, electrical and utility installations; Ellery Husted of Washington, D. C. as master planning consultant; and Landrum and Brown of Cincinnati for economic studies and forecasts.

Land acquisition for the 10,000-acre airport started January 27, 1958. By October, 1958, some of the largest machinery in existence had moved in to prepare the ground. Before any construction could begin, more than 12 million cubic yards of earth had to be excavated, 1,200 acres of woodland cleared and 580 buildings demolished. To reduce noise, no standing timber was removed from a belt extending 1,000 feet inward from the airport boundaries, and approximately one-and-a-half million seedling trees later were planted to form a belt 1,000 feet wide around the perimeter of the airport.

Travelers arriving by air will see three 150-foot wide runways. The two parallel 11,500-foot North/South runways overlap 50 percent of their lengths. Between the overlapping sections, a 5000-foot long, 800-foot wide jet parking apron is located a half mile south of the terminal building. Air-

. . . NEW GATEWAY TO THE NATION

liners will discharge passengers at this parking apron onto the mobile lounges, which will carry them to the terminal building.

The third runway, lying West-Northwest/East-Southeast, is 10,000 feet long. All are made of concrete 12 to 15 inches thick over a 9-inch depth of crushed stone, strong enough to withstand the continuous impact of jets weighing half-a-million pounds. Each runway has a series of high speed turnoffs designed so that an airplane landing at any speed may clear the runway in 30 seconds after touchdown.

It is estimated that 69 percent of all takeoffs and landings will be made to the north, using the easterly North/South runway for landings and the westerly North/South runway for takeoffs. Both general aviation and the airlines benefit from this arrangement. Landing jet airliners make a left turn dogleg to the jet parking apron for mobile lounge, fueling and maintenance service; on takeoffs, they make a right turn dogleg onto the westerly North/South runway.

Landing general aviation airplanes have a choice. They can taxi up to the ten-gate feeder and executive aircraft apron directly in front of the terminal, unload passengers and proceed to the general aviation area for servicing. Or, light aircraft coming in high on the easterly North/South runway will find themselves right at the 30-acre general aviation area northeast of the terminal building where, initially, one fixed base operator will provide flight line servicing. Space is provided for any other interested fixed base operators.

The most memorable sight at the airport, from the air or from the ground, is the late Eero Saarinen's masterpiece—the glass-walled terminal building—a curved concrete roof supported by 32 giant outward-leaning columns, 65 feet high on one side of the building, 40 feet high on the other.

Mobile lounges, an integral part of the terminal design, are an innovation in passenger service and convenience. Departing passengers walk a few steps from the terminal entrance to ticket counters and then to well-appointed waiting rooms—the mobile lounges. At flight time, the lounges are driven from the terminal to waiting airplanes parked a half mile away and passengers embark on the airplanes over telescoping walkways. The process is reversed for incoming passengers.

Helicopters operate from a 600-foot long helistrip south of and parallel to the terminal building. There are three taxiway outlets for easy access to the executive aircraft and feeder line apron in front of the terminal.

In the northeastern section of the airport, work has started on a general aviation hangar by Page Airways, the airport's first fixed base operator. The Government plans to build one two-bay hangar northwest of the terminal. The airlines are expected to build others.

A fast moving link between downtown Washington, D. C., and the airport is provided by a 14.7-mile access road limited to airport traffic and connected to an express highway. Travel time is approximately 40 minutes.

It is estimated that almost 12,000 general aviation takeoffs and landings will be made at Dulles in its first year of operation. This will increase to 18,000 by 1967. Airliners are expected to account for 65,000 takeoffs and landings in the first year, and 115,000 by 1967. By 1975, 6,000,000 people will travel annually through this new gateway to the U. S.

Mobile lounge seals to terminal building for easy entrance.

An Innovation in Passenger Comfort

Protected telescoping ramp leads directly into plane.

Fast sprints with full travel pack through airport terminal finger mazes are a thing of the past at Dulles International Airport.

In designing the terminal, the late Eero Saarinen took the footwork out of air travel with a new use for the wheeled vehicle.

Instead of the conventional terminal with long fingers crawling out to airline gates, Saarinen designed a compact building where, within the space of 150 feet, passengers walk from entrance to ticket counter to waiting rooms—which he put on wheels. These are the mobile lounges.

Twenty lounge gates are spaced at regular intervals along the south or airport side of the terminal. The lounges are part of the total airport design which provides a 30-plane apron a half mile south of the terminal where jets are parked and serviced. Noise, noxious fumes and other objectionable features of ramp operations are effectively removed from passenger areas. Drivers shuttle the lounges between the terminal and the apron under radio control.

The lounges can be driven from either end. Approaching the terminal, the driver steers from the end which seals to the building. Passengers exit through two doors on each side of the driver into the terminal's main lobby, walk a few steps to a "down" escalator, pick up their baggage on the ground floor, and walk out to the deplaning ramp for taxis and buses.

Leaving the terminal for the apron, the driver steers from the other end. Passengers leave the lounge on telescoping canopied ramps connecting to airplane entrances. Each 70-seat lounge carries up to 90 passengers.

Lounge chassis were built by the Chrysler Corporation of Detroit. Lounge bodies were built by The Budd Company of Philadelphia. Each 76,000 pound vehicle is 54 feet long, 16 feet wide and 17½ feet high, supported by four giant tires. Drive power is supplied by twin 172-horsepower gasoline engines located at each end of the lounge. They are air conditioned and heated. And the short wait is made even more pleasant by still another innovation—piped-in music. ■

From initial surveys to completion, zoning was a consideration.

Zoning – for Today and Tomorrow

Problems of zoning around Dulles International Airport got careful attention long before the first spade of earth was turned.

FAA officials realized that proper zoning could nurture or inhibit growth; it could make good neighbors or disgruntled ones. It also can contribute to community development. With the right type of building design and construction, and in the right location, certain businesses or light industries derive many benefits from an airport location without being vulnerable to airport noise.

When FAA secured the site for Dulles International Airport, the first move was to obtain plenty of space around the airport. Nearly 10,000 acres of land in this sparsely settled and primarily agricultural area were purchased. Considering the length and layout of the runways, this was not extravagant.

Although zoning of property around airports is the sole province of the community, FAA submitted to county planners a map identifying critical noise areas to aid them in dealing with real estate development even before scheduled flight operations got under way full-swing.

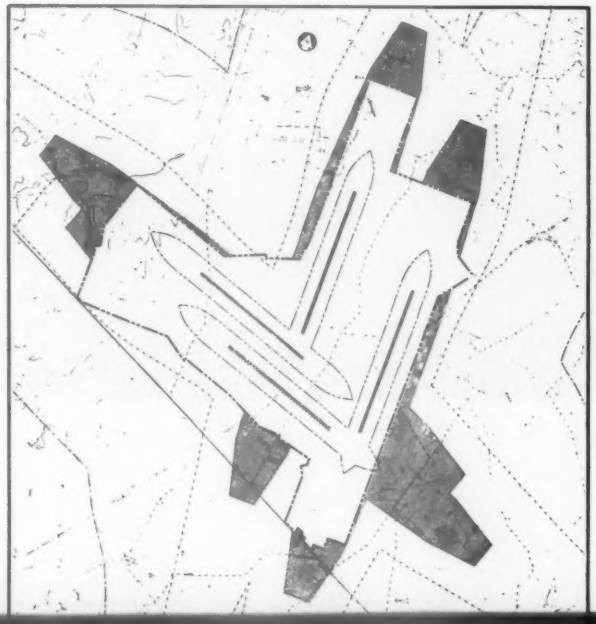
Because the airport is located in both Fairfax County and Loudoun County, many conferences were held with officials from both counties regarding the formation of zoning restrictions. Land-use maps also were prepared. County officials are being encouraged to zone critical noise areas beyond airport boundaries for light industrial and commercial purposes. As yet, zoning around Dulles International Airport is not completely settled, principally because the airport is not in full operation. These communities will be making their decisions after they have observed and heard airplanes in daily operation under varying conditions.

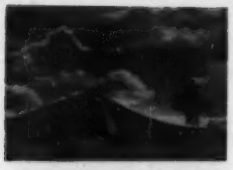
Other discussions have taken place with the Federal Housing Administration to learn what that agency might be able to do to encourage prudent location of residential housing near the airport. Customarily, the FHA has denied loans to prospective home owners who seek to finance homes located too close to an airport and where noise might tend to devalue the property. With respect to property near Dulles, the FHA has agreed to abide by the criteria established in **Noise Abatement Planning Series #3.** Loans for residential housing in areas of concern will be made on an individual basis depending on the type of construction.

The map of Dulles International Airport below shows the outline of the three runways and a proposed fourth runway which can be added if needed in the future. The first line surrounding the runways is the 110 decibel area—the loudest zone. The darker, hatched area aligned with the ends of the runways is the 100 db area, where the noise level is termed extremely high. This area is considered too loud for everyday living and for places of public assembly, such as schools and churches.

The 90 db very-loud area, outlined next, extends from the ends of the runways and follows the flight path of the airplanes. The 80 db zone is the outer line shown on map. ■

Careful noise studies helped determine airport zoning criteria.





Jetport Caters to Small Planes

The nation's newest airport was designed to cater to the needs of the smallest as well as the largest.

Since October 1, when the tower and associated facilities were commissioned, fifty percent of the practice touch-and-go operations were made by general aviation pilots in airplanes ranging from Tri-Pacers to Beech Travelairs. All operations, airline as well as general aviation, initially were restricted to the westerly North/South runway.

When airlines begin scheduled flights in mid-November and all three runways are open, general aviation airplanes landing to the north on the easterly North/South runway finish their rollout next to the general aviation area with a minimum of taxiing for flight line servicing, tie-down and hangar facilities.

Since the whole concept of the offset parallel runways is to eliminate unnecessary taxiing—effectively accomplished for the airline jets—the same runways with special air traffic procedures eliminate undue taxiing for general aviation as well. If traffic permits, departing general aviation pilots need not use the departure runway but may take off from the same runway used on arrival.

Until completion of the general aviation hangar in January, gas truck and tiedown services are available in the general aviation area. Initial fixed base operator is Page Airways International, which has started construction (*below*) of a 120 x 130-foot hangar to accommodate the largest airplane in the general aviation fleet. All services will be available for both piston and turbine airplanes, including engine changes, redesign and modification of airframes and interiors, and electronic and instrument work. Emergency maintenance and fueling will be provided around-the-clock.

Special services for general aviation pilots include free use of executive offices and conference rooms, as well as a recreation area and sleeping accommodations. Charter pilots will be on call 24 hours a day.

Under a five-year agreement with FAA, Page will collect landing and parking fees and provide ramp service on the feeder apron adjacent to the south wing of the terminal. ■

Dulles Fueling System Is Fast and Efficient

FAA planners had to think far ahead when they designed the aviation fueling system at Dulles International Airport —one of the most advanced systems in the world.

At its simplest, the problem in planning could be viewed like this: Take one average jet airliner which has just unloaded and wants to take on about 15,000 gallons of fuel. The idea is to refuel it as quickly as possible so that with a new load of passengers and cargo aboard, it can get back in the air—the only place where it pays its way.

Private and executive aircraft don't demand the same large amounts of fuel, but they do want the same fast service.

Multiply this by the number of planes that may stop at the airport at any one time and there is a real problem in doing the job rapidly and safely. The situation is further complicated by the different fuels required by various types of planes.

The fueling system at Dulles is designed to do the job. Aviation fuel is delivered to the airport and placed in storage at the tank farm, located just east of the runways. There, nine tanks having a total capacity of 5,000,000 gallons are located, together with the pump station and the fuel control building. Before entering the lines, the fuel is filtered in the first of two such processes for water, dust particles and foreign matter. Leading from the tanks to the areas where airplanes are parked are five underground systems.

The airliners are refueled from hydrants located in underground pits covered by lids. Refuelers connect a hose from the mobile filter separator hydrant cart to the hydrant valve in the pit. Another hose is connected from the cart to the airplane fuel tank. The fuel flows from the hydrant valve in the pit, through the filter and water separators in the cart, to the tanks in the airplane.

On the jet parking apron there are four hydrants with a selection of two different jet fuels located at each of the thirty loading positions. This permits an airplane to be refueled simultaneously at two points at a rate of 600 gallons per minute at each point, or a total of 1,200 gallons per minute.

In order to refuel the smaller jet aircraft used by general aviation, one additional hydrant is located between each of the thirty loading positions, making a total of fourteen hydrants. These points also have a flow of 600 gallons per minute. Five grades of aviation fuel can be dispensed through the hydrant system, with any two delivered simultaneously at the jet area.

To handle the fueling of feeder-type airliners and helicopters, one additional underground line leads to a truck-fill stand on the feeder airline apron. For flexibility, these planes are refueled from fuel trucks.

Fueling of the light, private airplanes and the larger corporate airplanes will be handled through the fixed-base operator. This area is located east of the terminal building, adjacent to one runway.

One last step that the planners of Dulles did not overlook in the fueling system was to arrange spacing and piping to allow for expansion of both storage and pumping capacities of the various systems as requirements increase. ■

Non-Agency Study of Near Mid-Air Collisions Confirms FAA Reporting

Problem areas outlined in the Flight Safety Foundation's Project Scan Report, made public last month, confirm the findings of FAA's own continuing study of near mid-air collisions.

The Foundation, a non-profit organization, received 2,577 anonymous, confidential pilot reports of near mid-air collisions between July 1, 1961 and June 30, 1962 in an independent study undertaken for the Federal Aviation Agency.

Single or twin-engine piston aircraft operating during daylight hours were involved in the vast majority of the reports. Air carriers were the least frequently involved of the three categories of aircraft —general, military and carrier.

This Project Scan (System for Collection and Analysis of Near Mid-Air Collision Reports) study was established by FAA as research back-up to FAA's regular, continuing program of pilot reporting. All regular reports to FAA, as differentiated from Scan reports, are fully investigated and evaluated, with corrective or enforcement action resulting where necessary. Pilots could report anonymously to Project Scan, so no follow up investigation was possible.

In the Scan final report, the Flight Safety Foundation concluded there were five "major problem areas" that pose particular dangers of mid-air collisions—high altitude military and air carrier operations, single-engine jet operating practices, Visual Flight Rule operations, terminal area procedures and radar limitations.

Major FAA programs are under way in each of these areas. They include extension of positive control areas, increase of information services for pilots, research and development on airborne electronic anti-collision devices, plans and programs for more segregation of aircraft by types in both enroute and terminal operations, cockpit design and altimetry studies, installation of new radars and improved displays, techniques and equipment.

During the period covered by the Scan study, there were 549 reports from pilots under the regular program. Review and evaluations by FAA technicians found 70 percent of them constituted "no hazard"—the direction of flight would have assured adequate separation. Pilot error in general procedures or failure to detect the other aircraft sooner was found in 119 cases, air traffic controller error in 52 cases and altimeter error in seven cases. Violation reports were filed against one or both pilots in 32 cases.

There were, according to Civil Aeronautics Board resumés, 22 actual mid-air collisions reported to FAA in 1961 and 24 in 1960. There have been 12 collisions thus far in 1962, seven causing fatalities. Mid-air collisions took a total of 21 lives in 1961.

There have been no mid-air collisions in 1961 or 1962 involving airliners. Two of the accidents in 1961 and two thus far in 1962 involved military aircraft. The rest of the aircraft involved were general aviation planes. In all, mid-air collisions in recent years have averaged less than six-tenths of one percent of all United States civil aviation accidents.

The total of incident reports per month in the Scan study showed a sharp decline by month—from 506 in the first month of reporting, July, 1961; to 147 in January, 1962; to 102 in the final month, June, 1962. The monthly totals in the standing FAA system remained roughly stable through the year. This tendency for a high level of initial reporting also characterized the start of CAB and FAA near-miss reporting systems upon their establishment in previous years.

Movie Available on Encouraging Limited Instrument Capability

A new film designed to encourage general aviation pilots to obtain at least limited instrument flight capability in line with the Blue Seal program has been completed by the FAA.

Entitled **One Eye on the Instruments,** the film was premiered in September at the annual meeting of the National Association of State Aviation Officials in Vergennes, Vt. The Aircraft Owners and Pilots Association announced plans at the meeting to donate one copy of the film to each State Aeronautics Commission which purchases an additional one.

The 16-mm. color-sound film runs 15½ minutes and features a professional cast. Pilot groups wishing to view the film should contact the nearest FAA field office to arrange for a free showing. Plans also are being made to show the film on television.

FAA's Blue Seal program was launched in October, 1961, to induce pilots to gain enough instrument skill to be able to turn around and fly out of bad weather. All new pilots are now required to have sufficient instrument capability to qualify for a Blue Seal on their certificates, and a concerted effort is being made by government and industry to encourage other pilots to obtain this capability. More than 25,000 Blue Seal certificates have been issued to date.

New Easy-to-Read Manual Offers Basic Flight Rules

Regulations of primary concern to pilots have been condensed and printed as a single 64-page booklet titled **Rules of Flight.**

This new booklet is not offered as a substitute for the formal rules, but as a guide for novices and a refresher for more experienced pilots. Pilots should be alert for changes in **Rules of Flight** which may be made between annual editions to reflect changes in the formal regulations.

Chapter I discusses concepts underlying the basic rules of flight. The following six chapters are devoted to Pilot Certification, Piloting Rules, Air Traffic Rules, Registration and Airworthiness Certificates, and Maintenance and Inspection of Aircraft.

A series of appendixes provide answers to such question as how to keep pilot certificates and instrument ratings current; how to get additional aircraft ratings; how to report an accident; locations of FAA Regional Offices and General Aviation District Offices; where and how to secure useful and informative publications such as **Flight Test Guides, Civil Aeronautics Manuals, Regulations of the Administrator, Aeronautical and Sectional Charts.** General aviation statistics also are included, as are tables for converting statute miles into nautical miles and vice versa.

The illustrated manual is available from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., at 55¢ a copy. It will be revised annually.

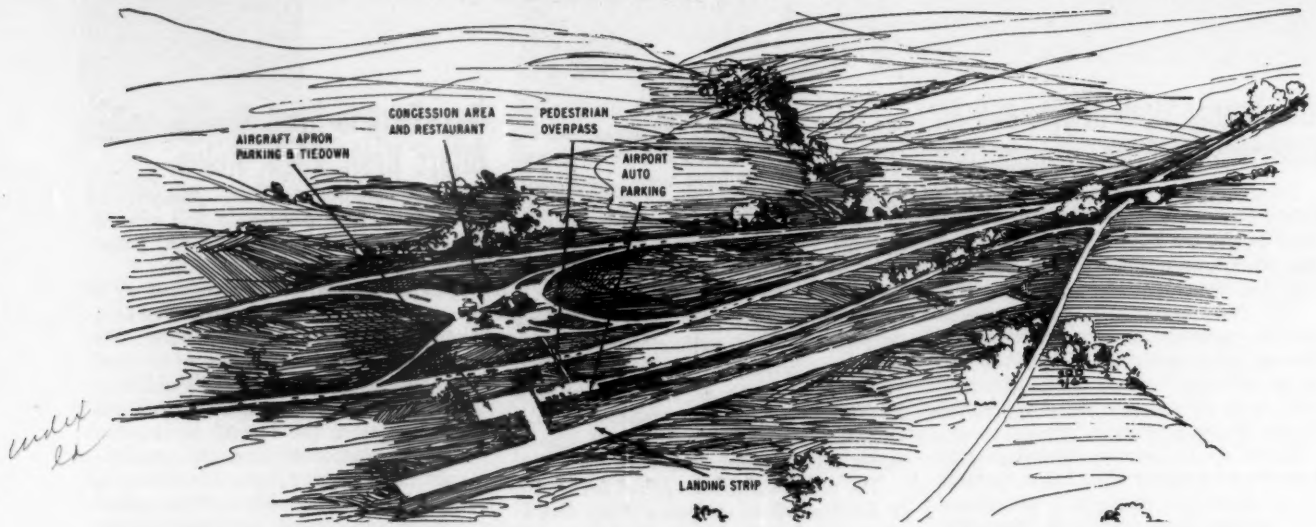
Surplus Chutes Offered for Sale

Surplus military personnel parachutes able to pass an airworthiness inspection by an FAA-certificated parachute loft will be offered to the public under a new directive issued by the Department of Defense.

Each military service now will turn over its surplus parachutes to a Government property disposal office. The chutes then will be put on sale provided they first are found serviceable by a certificated loft.

International orange and white parachutes will not be sold, however, since their use by sport parachutists could interfere with rescue operations. Parachutes used in paratroop operations also will be withheld since they are not suitable for sport jumping.

Prospective buyers will bid on those parachutes offered to the public. Inspection costs will be added to the price.



GENERAL AVIATION AIRPORTS GET NEW IMPETUS

FAA is moving in new directions in its efforts to encourage communities to develop general aviation airports by helping reduce construction costs.

The FAA airport program recently has been directed along two main new avenues. The first proposes more flexible standards for small airports. Administrator Halaby believes that adoption of this measure alone will for the same amount of money at least double, and possibly raise to 8,000 or more, the 3,386 airports included in the five-year National Airport Plan. The other step in the new program is to coordinate airport planning and construction more closely with highway programs.

Revised standards for airports have already been submitted to industry for comment. They would permit communities to tailor their airports more precisely to their needs. These criteria are expected not only to encourage the construction of new airports, but also the improvement of existing facilities.

Three classes of airports have been proposed under this plan. Their specifications are dictated principally by the type of airplanes the community expects would use the facility. Minimum uncorrected runway lengths and widths proposed for the three classes are:

Class I—2,000 feet long and 40 feet wide

Class II—3,000 feet long and 50 feet wide

Class III—4,000 feet long and 75 feet wide

Also designated for each class of airport are the size of the approach-departure areas and clear zones. In addition, the new criteria cover requirements for taxiways, airplane parking areas, hangars and airport buildings.

Land requirements for the three classes of proposed airports would vary depending on several factors, but could range from a minimum of 25 acres for Class I airports, to 37 acres for Class II and to 51 acres for Class III airports. This would not include space for clear zones, which call for an additional 5.4 acres for Class I airports, 6.4 acres for Class II and 7.4 acres for Class III. These areas, tailored realistically, will cut land acquisition costs.

Another difference between the proposed standards and existing criteria is that the width requirements of runways have been significantly pared down. If a community knows what type planes are going to use its landing strip, it is possible to specify a practicable width.

The second measure designed to encourage development of airports for small communities is based on a new concept—airports and highways should form an integrated part of a comprehensive national transportation system. Communities need airports that are accessible to a good highway system, which increases the utility of the private and corporate airplane using them.

By integrating airport planning and highway planning, other benefits can be derived. Land acquisition costs are reduced and, more important, construction costs can be cut. Heavy equipment and the skilled labor needed to build highways conceivably could be at nearby airport sites for construction.

An excellent example of what a coordinated airport-highway approach can do for a state is evident in Oklahoma. There, the non-tax supported Oklahoma Turnpike Authority is planning and has under construction four strips adjacent to turnpikes. These sites, similar to the one at Chickasha (*above*), are convenient to turnpike restaurants and facilities, and at the same time they provide rapid access to nearby communities. The case of Oklahoma, although successful, is not new. Other states have started similar programs; Alabama, California, Michigan and Mississippi, to name a few.

National interest was generated when Administrator Halaby recently proposed to Secretary of Commerce Hodges that action be taken to bring the Nation's highway and airport programs into closer coordination.

This plan, still in the preliminary stages, envisions close liaison between the Bureau of Public Roads and FAA's Airports Service. Generally, future interstate highway planning will be examined to determine if new airports should be located along interstate routes. Conversely, any requests for new or improved strips by public agencies will be examined in the light of planned or pending highway construction programs.

Many details will have to be ironed out and success of the program will depend on cooperative efforts and help from state aviation agencies and highway departments. The ultimate responsibility for success will rest, however, on those communities that recognize the advantages in developing suitable facilities for rapidly-growing general aviation.

Letters to the Administrator

FAA

FAA Aviation News welcomes comments from the aviation community. We will reserve this page for an exchange of views. Please keep them brief. No anonymous letters will be used, but names will be withheld on request.

• Seat Belts

Are there any regulations pertaining to the use of seat belts during the course of a domestic scheduled air flight?

Joseph D. Bulman
Washington, D. C.

Section 40.174 of Part 40 of the Civil Air Regulations requires individual safety belts for each passenger and crew member (excluding infants) during takeoff and landing. The single exception is that only one belt is required for one or two persons lying in a berth during takeoff and landing. During flight between takeoff and landing, one safety belt is sufficient for two persons occupying a multiple lounge or divan seat. In addition, Section 40.177 of the CARs requires that all airplanes be equipped with signs visible to passengers and cabin attendants to notify them when smoking is prohibited and when safety belts should be fastened.

• Flight Attendants

When the final rules are adopted concerning the mandatory training of flight attendants, will such persons be granted an aeronautical rating?

Charles A. Shubat
St. Paul, Minn.

Flight attendants are not classified as airmen by the Federal Aivation Act of 1958. Accordingly, certificates or ratings are not issued to these crew members.

• Use of Unicom

I hold a private pilot's license and I have approximately 350 hours flying time. I am most happy with the regulation requiring a pilot to contact an FAA Flight Service station when approaching an airport which has no control tower. It seems to me it would be proper to extend this rule to cover airports where there is neither an FSS nor a control tower, but where there is a Unicom station. Even if the Unicom is without an operator, the fact that a pilot is reporting his approach on the Unicom frequency would alert other pilots in the area to his presence in the air.

J. H. D.
Kennett, Mo.

At present, FAA has under development a proposal to amend the regulations governing operation of aircraft on and in the vicinity of airports which do not have a control tower. Your suggestion will be given careful consideration in the development of this proposed regulation.

• Smoking on Airplanes

I have just returned from a trip by plane to Honolulu and wish to call your attention to the practice of smoking on airplanes. I thought a dangerous situation existed when the passengers were ready to sleep and the lights were turned low, but smoking continued on and off all night. People are being burned every day when they drop off to sleep while smoking. If a person should fall asleep in an airplane and drop a cigarette on the seat or blanket, it might cause smoke and even panic. I would suggest that a rule be enforced that smoking not be permitted after 10 p.m., or when lights are dimmed.

Harrison E. Baldwin
New Haven, Conn.

Although we can appreciate your concern, you may be relieved to learn that no flammable objects may be installed in the passenger compartments of modern aircraft. Equipment such as rugs, seat covers, curtains, blankets and the like must be flame-resistant. Unlike the person who falls asleep in bed, an airplane cabin is not only observed by passengers in various stages of wakefulness, but also by one or more alert stewardesses who are trained and equipped to handle any such emergency. In the hundreds of millions of passenger miles that have been flown, we have never had an accident attributable to a cabin fire lighted by a carelessly discarded cigarette.

• Canadian License

In December 1959 I obtained a student pilot certificate and acquired 19½ hours of flight time before being transferred to Canada by my company where I procured my private pilot license. I am now about to return to the United States. Will my valid Canadian license be acceptable in the U. S., since the written examination and flight tests are comparable in both countries?

J. T. Stoica
North East, Pa.

Your Canadian pilot license is valid in the United States for the operation of Canadian registered aircraft only. You may qualify for a U. S. private pilot certificate by presenting evidence that you meet the aeronautical experience requirements and by passing the prescribed written and flight tests.

• Jet Takeoffs

Yesterday my son reported back to his Army post. When his airplane took off from the Detroit Metropolitan Airport the ship was raised off the ground about two-thirds of the way down the runway at an angle of about 30°, after which it appeared to slow down. Later, another jet made a takeoff at not so steep an angle. I am a licensed pilot with 500 hours of flying and I have always felt an airplane should fly off the runway by itself and not be pulled off.

Victor E. DeSchoepmeester
Roseville, Mich.

The takeoff procedures of jet aircraft are considerably different from those of piston aircraft. Due to their far greater relative power, these aircraft are literally "pulled off" the ground upon reaching a pre-computed lift-off speed. In order that the maximum safe speed for the flaps extended configuration is not exceeded, it is necessary to climb steeply—particularly if the aircraft is lightly loaded. Furthermore, different makes or types of jets have different climb characteristics and, due to the large amount of reserve power, the possibility of engine failure is remote.

• Link Instrument Time

I have several questions regarding the crediting of Link time. For example, may 5 of the 10 instrument hours required for a commercial pilot rating be accomplished in the Link? Could 20 hours of Link time be applied to the 200 hours total required for a commercial rating? Is my interpretation of the Civil Air Regulations correct that 20 hours of the 40 required for an instrument rating may be accomplished in the Link Trainer?

Frederick J. Wright
Toledo, Ohio

Federal Aviation Regulations do not allow time obtained in a synthetic trainer to be credited toward the 10 instrument hours required for a commercial pilot certificate; neither is time obtained in a synthetic trainer acceptable toward the 200 hours of flight time required for that certificate. The regulations do permit acceptance of not more than 20 hours of instrument time in a synthetic trainer toward the 40 hours required for an instrument rating.

• FAA-AF Cooperation

I wish to express the appreciation of this squadron for the cooperation extended by the personnel of the FAA Flight Service Station to our unit during simulated recovery operations conducted recently at the Vero Beach Municipal Airport.

Their help contributed considerably to the accomplishment of our mission.

Lt. Col. Francis W. Fennimore
Commander,
9320th AF Reserve Recovery Sq.

This month, cartoonist Robert Osborn cocks a weather eye around and comes up with a timely admonition in his usual place on the next page.

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